

6.1 INTRODUCTION, METHODOLOGY AND FINDINGS

This chapter presents forecasts regarding current and future needs for boating-related facilities in the Delta. These forecasts were developed through a series of analyses starting with the development of estimates for the year 2000 annual and peak-day visitation. Present facility needs and deficiencies have been established in **Chapter 5**. In this chapter, through the analysis of a combination of key trend variables, estimates of future visitation were developed for the time horizons of 2005, 2010, 2015, and 2020. Next, standards were developed and applied that translate the peak-day demand figures into facility need estimates for both present visitation and the future targeted horizons. Marina slip, dry boat storage, fuel station, and bilge pump-out station requirements for future years were developed separately. A different methodology was used in which the year 2001 inventory of facilities was established as the baseline and then future demand was projected based on population growth. Order of magnitude costs were then estimated for each deficient facility type and applied to the projected levels of demand at the specified time horizons.

Two analytical models were used in this study to forecast future boating activity in the Delta: a Demand Model and an Econometric Model. The derivative projections included estimates for facility needs based upon annual boating visitor days and peak-days.

The following is a summary of the methodology and findings pertaining to existing and projected demands for boating and boating-related facilities. A more comprehensive discussion of each of the following topics is found in the body of this chapter.

DELTA BOATING-RELATED ANNUAL VISITATION DAY ESTIMATES FOR THE BASELINE YEAR 2000

These estimates for Delta visitation and boating trips have been derived from survey data developed through this study, in addition to several other surveys conducted in the past, and an econometric model prepared as a part of this

report. The year 2000 was selected as the benchmark year for this study.

Annual Visitor Days

- A range of 5.8 to 9.5 million annual boating-related visitor days was estimated for the baseline year 2000.
- For the purpose of this analysis, the baseline for visitation was established from the year 2000 data with a total of 6.4 million annual boating-related visitor days for that year.

Annual Boat Trips to the Delta

The aggregate annual boat trips to the Delta in the baseline year 2000 can be further broken down as follows:

1.98 million small-boat trips

.15 million large-boat trips

2.13 million total boat trips

FIVE PRIMARY TRENDS ANALYZED

In order to determine a robust model for projected demands for recreation in the Delta, this study looked at multiple trends as potential determinants to future boating use in the region. The objective was to look for patterns among the different trend dynamics and then cross-check between them to weed out possible anomalies. Subsequently, five primary variables were identified through this study that are viewed as potentially the largest influences effecting future boating use in the Delta. These variables involve trends or changes in:

- Population growth and demographic characteristics
- Total resources-related outdoor recreation use (statewide data)
- Boat registration and ownership patterns
- Quality of the Delta resources and facilities
- Economic conditions

Each of these trends was evaluated and the primary determinants identified. A summary of these recreation use determinants is provided below.

Trend 1 - Population Growth and Demographic Characteristics

Key population growth-related trends noted in statewide census data obtained from the California Department of Finance have been applied to the population values for the Delta’s Primary Market Area (PMA). This area includes 13 counties contained in and contiguous to the Delta (See **Figure 6-1**). The following are the relevant population and demographic characteristics.

- Population within the state as a whole increased by 1.8 percent annually over the past 20 years, while population within the identified PMA increased by 1.6 percent annually during the same period.
- Seventy-five percent of the boat owners surveyed reside within 75 miles of the Delta and within the PMA.
- Population dynamics within the PMA are comparable to California at-large population dynamics.
- Approximately 87 percent of the present boat owners utilizing the Delta are between the ages of 40 and 75. Also, approximately 95 percent are Caucasian. This population segment has been identified as the Primary Boater Population (PBP).
- The PBP segment within the PMA is projected to grow from 1.06 million to 1.20 million between 2000 and 2010 and then decline back to 1.14 million by 2020. This decline is a result of the peak population bulge referred to as the “baby boom” passing into, and then out of, the primary boater population age group.

Trend 2 - Delta Share of Total Outdoor Recreation Use

The California Department of Parks and Recreation (DPR) conducts outdoor recreation preference surveys approximately every five years. Surveys from 1992 and 1997 were reviewed in this

research in regard to the relative standing of boating- and water-related recreation preferences. Projections were developed for the year 2000 by extending the apparent trends identified from the 1992-1997 data. Significant findings from this review are as follows:

- Since 1990, the total per capita resources-related outdoor recreation use in California increased at a rate of 0.4 percent per year higher than California’s growth rate.
- Growing resource-related recreation preferences include nature-related beach activities, and swimming in lakes, rivers, and the ocean.
- Resource-related preferences that are flat in growth include powerboating, kayaking, rowing, and canoeing.
- Declining resource-related preferences include sailing, windsurfing, fishing, water-skiing, and hunting.
- In general, the DPR surveys suggest that boating activities in California have not kept pace with population growth since 1992.

Trend 3 - Boat Registration and Ownership Patterns

This information is derived from the combined Department of Motor Vehicles and United States Coast Guard (Documented Vessels) registration information for boats registered in California.

Table 6-1 outlines the growth of registered boats in California.

**Table 6-1
Boat Registration and Ownership Growth**

Annual Boat Ownership Growth	1981-2000	1990-2000
Small-boat	2.61%	1.46%
Large-boat	2.72%	2.88%
Total boat growth	2.62%	1.56%
California Population Growth	1.80%	1.30%

Significantly, within the total aggregate of registered boats in California, PWCs accounted for 80 percent of the increase between 1990 and 2000. In the year 2000, PWCs made up a total of 19 percent or 175,226 of the total 925,533 registered boats in the state.

Trend 4 - Quality of Delta Resources and Facilities

The status of the Delta resource itself has been found to be the most difficult variable to quantify in terms of its influence on existing and future boating use. This study takes into consideration the assortment of actions proposed through the CALFED program and then translates those actions into two primary categories: actions adding value to the quality of the Delta boating experience and actions that can further limit or diminish that experience. Delta characteristics and planning actions that could affect the attractiveness of the Delta include the following:

- CALFED actions focusing on environmental restoration and the improvement of water quality may add value to the experience for future Delta boaters if the proposed improvements are implemented as planned.
- According to the *Critical Water Shortage Contingency Plan*, December 2000, “Critical water shortages may occur in the next several years severely impacting the health, welfare,

and economy of California.”¹ In the event of a severe water shortage, increased future summer releases and the resulting draw-downs of reservoirs in Northern California have the potential to force boaters to migrate from these affected reservoirs to the Delta, where the water level will remain relatively stable.

Other CALFED actions, including levee repair, environmental restoration, and/or water transfer-related actions, could lead to a reduction in the range of boating experiences currently possible in the Delta. These actions could result in the temporary or permanent closure and restriction of boating in the Delta sloughs and waterways and the disruption of established boat traffic routes.

Trend 5 - Economic Conditions

Economic indicators within the PMA have been viewed as neutral. This finding is based on the observation that the leading indicators tend to balance or cancel out disparate influences. Economic influences on boating use are perhaps most evident in the higher rate of growth of registered boats (large boats) when contrasted with the growth in population.

PROJECTED-USE MODELS

Six projected-use models were developed to provide a probable range of annual visitor days that could then be evaluated. The models test different projected visitor rate scenarios and can be characterized as follows:

- Model 1-Composite of all Models
- Model 2-Population Variable Model
- Model 3-Boat Registration Growth Versus Population Growth Model
- Model 4-Enhanced Delta Resource Based Model
- Model 5-Combined Variables Model
- Model 6-Econometric Model

¹ *Critical Water Shortage Contingency Plan* page 1-1, Prepared by the Governor’s Advisory Drought Planning Panel.

Based upon an analysis of five primary variables contained in the first five models above and the findings of the econometric model presented in Model 6, it is projected that annual boating visitation use will increase at the rate of .79 percent per year from 2000 to 2010 and at the rate of .46 percent per year from 2010 to 2020. The slowing down of the annual growth rate in the later period is the result of the “baby boom” bulge moving through the primary boater population age group.

Since the primary boating public consists of persons from age 40 to 75, as the “baby boomers” move out of the active boating years, a decrease in the rate of growth in annual boating visitation is expected to occur after the year 2010. In summary, the annual visitor days are projected to grow from 6.4 million in 2000 to 8.1 million by the year 2020.

FACILITY DEFICIENCY ESTIMATES

Facility need estimates were developed for the specified time horizons of 2000, 2005, 2010, 2015, and 2020. Projected demand forecasts based on visitor estimates were applied to baseline data of existing facilities as described in **Chapter 5**. This analysis generated these demand forecasts of facilities by weighing projected visitation against industry standards for those facilities.

Deficiencies were revealed for most facility categories in each of the time horizons. Finally, findings from this needs analysis were compared with facility needs information obtained through survey outreach with users and marina operators. The facility deficiencies identified in this analysis, as matched with the user and marina operator survey information, help substantiate the general findings regarding facility needs. **Table 6-2** provides a thumbnail overview of anticipated facility deficiencies based on projected boating needs for the 2000–2020 time period.

**Table 6-2
Facility Deficiencies**

Facility	2000-2020 Estimated Deficiency
Covered Boat Slips	2,051
Uncovered Boat Slips	880
Boat Launch Lanes	92
Vehicle with Boat Trailer Parking Spaces	1,968
Transient Dock Tie-Ups	273
Restroom Stalls	187
Shower Stalls	89
Day-Use/Picnic Sites	173
Fuel/Pumping Stations	14
Dry Boat Storage Facilities	466

6.2 BACKGROUND STUDIES

Six primary boating- and Delta-related reference documents served as the study’s principal data sources. They include:

California Boating Facilities Inventory and Demand Study, California Department of Boating and Waterways, June 23, 1995.

Sacramento-San Joaquin Delta Recreation Survey, California State Parks, 1997.

Recreational Boating Activity Trends in California 1995 - 2020, California Air Resources Board, 1997.

Delta Facility Inventory, Delta Protection Commission, 1997.

Public Opinions and Attitudes on Outdoor Recreation in California, California Department of Parks and Recreation, March 1998.

Layout, Design and Construction Handbook for Small Craft Boat Launching Facilities, California Department of Boating and Waterways, March 1991.

6.3 DELTA BOATING VISITATION

BOATING VISITS TO DELTA IN YEAR 2000

The statewide user surveys generated a variety of information helpful in making estimates regarding the extent and characteristics of Delta visitation. The surveys helped to quantify the number of boaters who had boated within the prior twelve months, the average number of trips they took, the number of days per trip, the average number of people on board, and the month and day of the most recent trip. This user preference information was then used to estimate the total visitation for the year 2000 and the peak-day visitation rate, with breakouts for small- and large-boat categories.

The estimated total number of boating-related visitor days to the Delta for the baseline year of 2000 was 6,386,178 – rounded to 6.4 million. Estimated boat trips to and within the Delta for the same period were 2,128,726. The total number of boating trips is then further subdivided by the boat size categories with small boats estimated at 1,980,900 trips (93%) and large boats at 147,826 trips (7%). See **Table 6-3**.

Annual Peak-Day Estimate

Utilizing the data referenced above, it was estimated that the peak-day visitation in 2000 was approximately 25,158 (total number of visitors). Actual peak-day trips for small boats were estimated to be 7,796 (93%) and for large boats 590 (7%). This equals an aggregate total of 8,386 boats (total number of boats). The breakout between large and small boats is consistent with the ratio of large to small boats in the Department of Motor Vehicle boat registration records.

6.4 BENCHMARK COMPARISON OF ANNUAL VISITOR DAYS FORECAST

The estimated total number of boat trips and visitation rates has been compared with other recent Delta studies using similar methodology. These results have been found to be within a range of 5.8 to 9.5 million annual visitor days in the year 2000 as shown in **Table 6-3**. This analysis involved taking the Delta's share of California-registered boats in the 1997 Delta Survey, the

1997 California Boating Trends Survey, and the three surveys that occurred as part of this research, and applying the same methodology to the data.

Finally, a separate visitation estimate was performed as a part of this study utilizing an econometric model that matches facilities with populations within the Central Valley and the San Francisco Bay region. This geographical area is similar, but not identical, to the 13 PMA counties used in this study (see **Appendix 6-1**). This methodology resulted in an estimated 6,625,472 visitor days for boaters and fishermen for the year 2000. Thus, this study's finding of an estimated 6.4 million annual boating-related visitor days to the Delta in the year 2000 matches favorably with these comparative studies and therefore may be considered as accurate as can be achieved using such methodologies.

6.5 TRENDS ANALYSIS

An analysis was conducted of the five primary trends believed to be indicative of future growth in boating in the Delta. The primary trend categories used for this study are:

- Trend 1** - Population growth and demographics
- Trend 2** - Preferences regarding resources-related outdoor recreation uses
- Trend 3** - Boating registration and ownership patterns
- Trend 4** - Quality of the Delta resources and facilities
- Trend 5** - Economic conditions

The specific determining factors for each of these trends are presented as follows:

TREND 1- POPULATION GROWTH AND DEMOGRAPHIC TRENDS

An analysis of population growth and demographic trends is essential to estimate future growth in boating. The relevant factors are overall population growth, growth within the Delta's PMA, and the changes over time in the primary age group that engages in boating. Data used for this analysis were obtained in part from the California Department of Finance.

Table 6-4 presents an overview of California’s population trends from 1980 to 2000. During this 20-year time period, the state’s population grew from 23.1 million to a total of 33.9 million residents. This represents an increase of 1.8 percent per year. Future projections show California growing to 44.4 million by the year 2020 for an annual average growth rate of 1.25 percent as shown in **Table 6-5**.

75 percent of the surveyed boat owners who reported having recently boated in the Delta reside within zero to 75 miles of the Delta – living within the six counties comprising the Delta and the seven contiguous or nearby counties. This area has been designated the Delta’s Prime Market Area (PMA). The PMA is shown in **Figure 6-1**, and the PMA counties are listed as follows:

<u>Counties within the Primary Market Area</u>	
Alameda	San Joaquin
Calaveras	San Mateo
Contra Costa	Santa Clara
Marin	Santa Cruz
Napa	Solano
Sacramento	Stanislaus
San Francisco	

Primary Market Area

The PMA for the Delta was viewed as a trade area in relation to consumer opportunities. That is, the market area was defined based upon the degree of penetration of available consumers. In this case, two approaches were used to identify and confirm the appropriate geographic area to be designated as the PMA.

First, statewide boat owner survey information was examined to determine the boat owner residence counties in the State with the greatest reported incidence of use of the Delta during the past two years (as a percentage of completed surveys for each county). Counties with the highest reported incidence of use (greater than 50 percent) were the thirteen counties identified as the PMA. Second, statewide boat owner county residence and boating county destination data¹

¹ *Recreational Boating Trends in California, 1995-2020, A Report for the California Air Resources Board, (1996 Boating Activity Day Matrix).*

were examined to establish the boat owner residence counties in the State with the greatest number of boating activity days among the thirteen PMA counties. The estimated total boating activity days identified in the thirteen PMA counties were performed by residents of the same PMA counties 77 percent of the time.

The result of this analysis shifted the PMA slightly with some counties contiguous to the Delta such as Yolo falling out of the PMA because the origin-destination data confirmed that, of the boating activity days generated by Yolo County residents, 70 percent occurred outside the both the thirteen-county PMA and Yolo County.

Secondary Market Area

With the PMA identified, a Secondary Market Area (SMA) was then defined. The Secondary Market Area is the next largest residence source of boaters who recreate in the Delta. The SMA was determined in a similar manner as that used for the PMA delineation. While the PMA was the principal point of origin for 77 percent of Delta Boating trips, the SMA was the point of origin for an additional 8 percent of Delta trips. Combined, the PMA and SMA represent 85 percent of the total place of origin for the survey-recorded Delta boating population. The remaining 15 percent therefore comes from other residence locations throughout the State. The 14 counties comprising the SMA are as follows:

<u>Counties within the Secondary Market Area</u>	
Amador	Monterey
Colusa	Placer
El Dorado	San Benito
Lake	Sonoma
Mariposa	Sutter
Mendocino	Tuolumne
Merced	Yolo

Table 6-6 and **Table 6-7** show the population characteristics and demographic trends for the population residing within the PMA from 1980 to 2000. During this period, the PMA has grown from a population of 6.5 million to 8.6 million residents, an increase of 1.6 percent per year. This rate of growth in the PMA compares with a 1.8 percent annual growth rate for the state as

indicated in **Table 6-4**. The population increases in the PMA represents approximately 23 percent of California’s total increase from 1980 to 2000. Population projections for the PMA suggest that it will grow to around 11.1 million by the year 2020 (**Table 6-5**). As described in **Chapter 4**, the boater survey revealed important demographic information about Delta boaters. Approximately 87 percent of the boat owners currently utilizing the Delta area are between the ages of 40 and 75. Also, nearly 95 percent are Caucasian. In this chapter, this largest population segment has been defined as the Primary Boater Population (PBP).

Through an examination of the demographic change during the past two decades as broken down by specific age groups, it can be determined that the fastest-growing age categories are residents aged 40 to 49 years (having grown at an annual rate of 2.9 percent) and residents aged 50 to 64 years (having grown at an annual rate of 2.8 percent). These two age groups comprise the lower and upper range of the baby boomers. In aggregate, the distribution of state residents from 1980 to 2000 is reflected in an increasing median age figure that moves from 29.9 years in 1980 to 33.3 years in 2000. The population dynamics in the PMA are comparable to the statewide figures as shown in **Table 6-4**.

In tandem with the trend of an aging population, the state’s population also exhibits considerable change in terms of the ethnic make up. The proportion of California’s population claiming European descent has remained essentially flat - having declined 35,427 (-.02%) between 1990 and 2000 (**Table 6-4** and **Table 6-6**). Statewide during the same period, other racial and ethnic groups have increased by 446,590 persons (4.0%). The population characteristics within the PMA also reflect these trends (**Table 6-5**).

Conclusions Regarding Population Growth and Demographic Trends

Three alternative population and demographic scenarios could be compared in anticipating future boating use in the Delta:

- **The Overall Rate of Population Growth in California:** From a comparison of the other trend influences reviewed, an estimate based

on this alternative falls on the high end of the range.

- **The growth Rate of the Primary Boating Population within the Primary Market Area:** An estimate based on this alternative is on the low end of the growth range.
- **75/25 Blend:** A 75/25 blend of the PBP within the PMA, combined with the State as a whole PBP, would match the approximate ratio of the origin of boat uses of the Delta. This alternative would be somewhat higher than the PMA-only alternative.

In combination, the three alternatives represent the range of potential levels of use that could be expected from a population/demographic perspective, with the 75/25 percent blend providing the most accurate measurement for predicting actual future boating demand.

The conclusion derived from solely evaluating population and demographic trends suggests that the Delta will absorb an increasing boating-related visitor day share at a modest rate for the next ten years and then will begin a very gradual decline in the following ten years as shown in **Table 6-8**.

Table 6-8
Annual Growth in Boating-Related Visitor Days by Time Horizon
(Percent)

Year	Annual Growth
2000–2005	+ 1.260%
2005–2010	+ 1.185%
2010–2015	- 0.458%
2015–2020	- 0.469%

See **Table 6-5** for a detailed breakdown of projected growth in visitor days as summarized above.

TREND 2 - PREFERENCES REGARDING TOTAL RESOURCES-RELATED OUTDOORS RECREATION USE

DPR has periodically surveyed the state over the past 40 years to assess preferences in outdoor recreation use, resources, and facilities. Although the methodology applied and the questions asked have evolved over the years, the state-issued surveys have remained relatively constant since 1992. Consequently, recreation preferences for a range of outdoor activities can be traced over this period of time. This study postulated that with a record of recreation preferences, this source of information could help identify and track the relative level of interest in boating-related recreation at the statewide level over the duration of the years surveyed.

The most recent surveys have categorized household use patterns for 38 different outdoor recreation activities, including driving for pleasure, field sports, and backcountry camping. For the purpose of this study, the various recreation uses have been further clustered into the broad categories of urban-related uses, education-related uses, developed city park type uses, right-of-way dependent uses (driving, jogging, walking, etc.), and, finally, resource-related uses. The resource-related uses include activities that are dependent on natural features, such as forests, deserts, beaches, reservoirs, and rivers. As shown in **Table 6-9**, by tracking these different use categories since the 1987 survey, general trends in these use categories can be surmised.

Three aspects of the resource-related outdoor recreation trends are important to this study. They are: 1) the overall average use per household in all resource-related activities, 2) relative increases and decreases in activity levels, and 3) trends within the spectrum of boating use.

Aspect 1 – Overall Use per Household in all Resource-Related Activities

As shown in **Table 6-4** and **Table 6-6**, both the California and the PMA's population grew at the annual rate of 1.3 percent from 1990 through the year 2000. At the same time, the annual level of resource-related outdoor recreation household participation days grew at the rate of 1.5 percent between 1992 and 2000 as depicted in **Table 6-9**.

Thus, the demand for resource-related outdoor recreation increased at a greater rate than the population of California grew during this same period of time.

The significance of this growth rate may be that California's increasingly ethnically diverse population will continue to enjoy the recreation opportunities associated with the state's outdoor resources. At present, use preferences may vary based on economic capability and ethnic or cultural preferences, but it is probable that all segments of the population will continue to pursue various outdoor recreation uses and venues.

Aspect 2 – Increasing, Flat, and Decreasing Activity Levels

Table 6-9 depicts the range of boating-related activities surveyed by DPR for the years 1992 and 1997, and estimated for the benchmark year 2000. Four observations are relevant to this study:

- A comparison of DPR survey data for the years 1992 through 2000 reveals that some recreation activities have increased in use, others have remained flat, and some have decreased in use.
- Some of the activities surveyed involved relatively small numbers of the total population, including golf, skiing, and boating. The survey shows significant swings in preference regarding these activities and suggests that the overall sample size of the survey may not have been sufficient to accurately predict the actual levels of use in these activities.
- The activities with the greatest increase in preference are generally highly active sports that involve some type of daring or risk-taking, such as rock climbing, snow-boarding, use of PWCs, and other active type sports. Other categories of recreation that are on the increase, include nature-related activities, beach activities, and swimming in lakes, rivers, and oceans.
- Resource-related preferences that are flat in growth include kayaking, rowing, and canoeing.

- Declining resource-related preferences include fishing, water-skiing, and hunting.

Aspect 3 – Trends Within Boating Use

The DPR Surveys from 1992 through 1997 include four types of boating activities. They are powerboating, water-skiing, kayaking, rowing, canoeing, and sailing/wind-surfing. The survey numbers indicate that:

- Water-skiing has declined from 2.4 million visitor days in 1992 to 2.2 million in 1997 and an estimated 2.0 million in 2000.
- Kayaking, rowing, and canoeing have declined from 3.2 million visitor days in 1992 to 2.5 million annual visits in 1997 and are flat at an estimated 2.5 million in 2000.
- Sailing and windsurfing have declined from 0.6 million visitor-days in 1992 to 0.5 million annual visits in 1997 with an estimated 0.4 million in 2000.
- Powerboating has increased from 6.9 million visitor days in 1992 to 8.0 million in 1997 and an estimated 8.5 million in 2000. Because powerboating includes PWCs, the overall increase in powerboating may be attributable to this single boating option. As one of the more active boating options, it may draw from broader segments of the population. This growth may help compensate for activities that are diminishing in popularity.
- Statewide, boating increased from 13.1 million annual visitor days in 1992 to 13.2 million days in 1997 and an estimated 13.4 million days in 2000.

Conclusions Regarding Resource-Related Outdoor Recreation Use

A conclusion drawn from evaluating the resources-related outdoor recreation trends and preferences is that boating in the Delta could grow at a rate greater than the primary boating population growth projections. This conclusion would be predicated upon the targeted marketing to PWC users and the boaters interested in the broader-educational values of the Delta region, including natural/open space, historic, and

agricultural values. This upward projection could theoretically match the projected population rate for the state as a whole. However, probable projections should not be based on the influence of potential marketing and, therefore, no additional visitation is projected based upon this factor.

TREND 3 – BOAT REGISTRATION TRENDS AND OWNERSHIP PATTERNS

In addition to the statistical user preference information developed by DPR, more precise information can be derived regarding boating trends by reviewing boat registration data from the Department of Motor Vehicles and the U.S. Coast Guard registration data.

Historic boat registration patterns broken down into the small- and large-boat categories are characterized in **Table 6-10**. The registration trends were evaluated for both DMV-registered boats and for USCG Documented Vessels. DMV records for the years 1981, 1985, 1990, 1995, and 2000 were examined. Unfortunately, records for Documented Vessels were only available for the years 1994, 1997, 1998, 1999, 2000, and 2001. The significant findings from this analysis for DMV registered boat records are as follows:

- Overall, DMV boat registrations from 1981 to 2000 have increased at a rate of 2.62 percent per year.
- The number of registered small boats grew during the past two decades at a rate of 2.61 percent annually, while large boat registration increased at a slightly greater rate of 2.72 percent.
- During the past ten years, overall boat registration growth slowed to an annual rate of 1.56 percent. Small boats increased at 1.46 percent, while large boats increased at 2.88 percent.
- From 1990 to 2000, the increase in personal watercraft ownership was responsible for 77 percent of the total boat registration growth, and 87 percent of the growth in small boats. PWC ownership growth is expected to continue in the future. Some factors that favor

this growth are the increasing diversity in models and sizes of PWCs, and improved technology reducing environmental concerns such as noise levels and levels of water and air emissions. Product improvement can also be expected to affect affordability, economy of operation, and flexibility in use and storage.

Conclusions Regarding Boat Registration Trends and Ownership Patterns

The DPR *Outdoor Recreation Preference Surveys* indicate that boating use in California is flat or slightly declining from 1992 to 2000 (estimated). This conclusion is not supported by DMV and USCG boat registration trends, which indicate that boat ownership has been increasing at a rate slightly higher than the California population rate from 1990 to 2000 (1.56 percent versus 1.3 percent). Therefore, it is assumed that future registration rates will continue to rise in tandem with population growth.

The greater increase in boat ownership compared with the population growth rate will influence future Delta visitation by adding a factor to the population and demographic trend lines described under Trend 1 above. This augmentation could range between the increase observed during the last ten years or at a greater rate as seen over the last 20 years. The additional boat registration growth over population growth for the last ten years was 0.26 percent while the extra growth for the past 20 years was about 0.82 percent.

TREND 4 –THE QUALITY OF DELTA RESOURCES AND FACILITIES

The future levels of boating in the Delta will not only be driven by population growth and the amount of interest and participation in outdoor recreation but will also be determined by the quality and the values offered by the Delta resource. Previous chapters of this study have described and quantified the public's perception of these values. In general, responses were very favorable regarding the natural resources and the variety of destinations available, but a significant level of concern was recorded regarding water quality.

The ongoing CALFED activities and programs aimed at improving the Delta resource demonstrate that state and federal agencies are concerned about the quality of the resource and have formulated a plan of action for its improvement. The funding for and the preparation of this boating needs assessment is also an indication of the awareness and willingness of the state to address the resource in relation to recreation.

Another variable relevant to the quality of the Delta resource is the relationship of the Delta to potential competing boating areas. There are a number of existing reservoirs where boating occurs within reasonable proximity to the Delta's PMA. As freshwater reservoirs, these water bodies generally have better quality water. But they also have disadvantages due to size, cooler water temperatures, and fluctuating water levels. It is anticipated that in the future, due to California's need for additional water to meet the demands of a growing population, many of these reservoirs will experience increased summer water draw-downs that will reduce their appeal and functionality for recreational boaters. It is presumed that these circumstances, when they occur, will increase the desirability of boating in the Delta, where there are relatively stable year-round water conditions.

Finally, unique water features and differences in wind exposure are major Delta associated attributes that provide appropriate settings for the wide variety of boating activities. Although user conflicts have been identified as an issue, there is also the physical capacity afforded by the Delta's nearly 60,000 surface acres of navigable waterways to help limit amount of conflicts between the various Delta recreational boating activities.

Conclusions Regarding the Quality of Delta Resources and Facilities

When solely considering this variable, it is anticipated that there will be little influence on use levels in the Delta over the next ten years. However, if marina refurbishments and CALFED's natural habitat and circulation improvements can be implemented during this period, the enhanced quality of the resource could strongly influence growth in Delta usage between

2010 and 2020. The increase in visitation associated with this variable could also be represented if it were combined with the trend influences described in this section. This increased growth factor related to water quality and environmental enhancement could range between 1 and 2 percent a year during the 2010 to 2020 time period. The most probable result that these positive influences could create would be a 1 percent annual growth increase. Implications of CALFED program associated actions are discussed in greater detail in **Chapter 7**.

TREND 5 – ECONOMIC CONDITIONS

The primary economic trends within the PMA are the growth in household income and the offsetting rising cost of housing. Long-term growth trends in rising disposable income (beyond these two offsetting factors) are best reflected in the growth of boat ownership in excess of the population growth rate.

In addition, a number of other economic determinants from fuel cost increases to recessions, to terrorist acts and changes in taxes, may have an effect on the future boating activity in the Delta. The predictability of these determinants, however, is beyond the scope of this study. A best estimate of the impact of economic factors on boating at this time involves a balance of self-canceling influences with no predictable overall impact on boating use in the Delta over the next 20 years beyond those previously identified.

6.6 DELTA BOATING-USE PROJECTIONS

There are six different models discussed in this section – each projecting annual boating visitor days to the Delta for the period 2000 through 2020. The numerical support for these models is depicted in **Table 6-11**. These models incorporate the trends and variables discussed in the previous section. They are graphically expressed here as in **Figure 6-2** through **Figure 6-7**. A range of possible scenarios is depicted along with a preferred projection for future Delta visitation level based on the judgment of this study.

MODEL 1 – COMPOSITE MODEL 2000-2020 VISITOR DAY GROWTH RATE

This model is the aggregation of the five identified variables affecting future boating use in the Delta, as described in the previous section. Taking each of these variables into consideration collectively results in the model shown in **Figure 6-2**. This model is a compounded graph that shows the anticipated rate of visitation growth between the time horizons of 2005, 2010, 2015, and 2020.

In this composite view, boating activity will increase between 2001 and 2020 in a range from 6.4 million to 8.1 million annual visitor days of use. As previously described, this view is based on the influence of the four primary trends of population, demographics, resource-related outdoor recreation use, boating preferences and ownership, and the quality of the Delta resources and facilities.

MODEL 2 – POPULATION VARIABLE 2000-2020 VISITOR DAY GROWTH RATES

Population growth and demographic characteristics suggest a range of three alternative boating use growth-rates as shown in **Figure 6-3**.

The most probable visitation rate derived from population-based trend variables alone is a 75/25 percent blend. This is a leveraged ratio that would seem to be the best characterization of the boating population in the Delta based solely on population trends.

MODEL 3 – BOAT REGISTRATION GROWTH IN EXCESS OF POPULATION GROWTH VARIABLE

Another variable influencing Delta boating use projections is the increasing boat registration growth rate in excess of the population growth. Three alternatives for this variable are shown in **Figure 6-4**. These variables include:

- 1) A zero increase;
- 2) An increase corresponding to the 1981 to 2000 rate of increase greater than the overall population (equaling a 0.82% annual growth);
- 3) An increase corresponding to the 1990 to

2000 increase greater than the overall population (.26% annual growth.)

The numerical values are shown in **Table 6-10**. The specific calculation breakdown is based on the following:

1981 to 2000:

A 2.62 percent annual growth boat registrations less 1.8 percent annual growth population = .82 percent annual growth of boat registrations in excess of annual population growth.

1990 to 2000

A 1.56 percent annual growth in boat registrations less 1.3 percent annual growth population = .26 percent annual growth of boat registrations in excess of annual population growth.

MODEL 4 – ENHANCED DELTA RESOURCES VARIABLE

Model 4 views the quality of the Delta resource as an influence on future recreation. This boating use projection is built around the improvement of the Delta resource and facilities. Three growth alternatives are shown in **Figure 6-5**:

- 4) No increase
- 5) An increase of one percent a year from 2010 to 2020
- 6) An increase of two percent a year from 2010 to 2020

The most probable increase as a result of this variable is a one percent rate increase between the interval of 2010 and 2020 to the selected population/demographic trend line plus the probable increase from extra boat registration growth.

MODEL 5 – COMBINED VARIABLES 2000 - 2020 VISITOR DAY GROWTH RATES

The three primary visitation influences outlined above are cumulative and result in a projected visitation growth over the next 20 years as shown in **Figure 6-6**.

This model displays five variables that create a possible range in visitation from 6.9 million to 11.9 million annual visitor days of use by the year 2020.

The most probable projection is shown with the triangle symbol. It would result in an increase of visitation from 6.4 million in 2000 to 7.4 million by the year 2010 and 8.08 million annual visitors by the year 2020. This represents the following annual growth for these two periods:

- 2000-2010 Total growth: 1.0 million (15.8%)
Annual growth: 50,500 (0.79%)
- 2010-2020 Total growth: .7 million (9.2%)
Annual growth: 34,100 (.46%)

The most probable annual visitation day growth for all boating for the period 2000 to 2020 is 1.7 million. This represents 84,588 annual visits at an average annual growth rate of 1.3 percent for the 20-year period.

MODEL 6 – ECONOMETRIC MODEL BASED GROWTH PROJECTIONS

This model shows growth projections for visitation based on an independently developed Econometric Model, as prepared by Foster and Associates, for this study. The Econometric Model resulted in a somewhat lower visitation estimate for the year 2000. The 2020 projection, however, is within 79,783 (.01%) of the most probable projection of 8.0 million as presented above. (See **Figure 6-7**.)

This model is based on multi-site facilities-augmented gravity travel cost model developed to forecast recreation demand in California's freshwater lakes. It was adapted for this study by determining the Delta's share of boating-related recreation opportunities. This report, entitled *Estimating Potential Demand for Freshwater Recreation Activities in the Sacramento-San Joaquin Rivers Delta, 1997-2020* is included in **Appendix 6-1** of this study.

6.7 DELTA DEMAND ANALYSIS

This section addresses the methodology used to determine the demand for boating and boating-related facilities in the Delta. A key element to this planning strategy is an understanding of the nature of facility demand. Without this understanding, policy can only be based on

general standards of supply and demand, such as population ratios (acres per thousand population) or service area (distance to boating facilities). Such standards are useful guides, but a demand analysis that links facility needs to actual and projected use ensures that the needs assessment reflects the particular recreating patterns of the Delta's boaters.

The design standards used in this study to determine the capacity for each of the reviewed facilities are described in this section. They are also further delineated in **Table 6-12** notes.

The four separate surveys undertaken as part of this study, and described in the preceding two chapters, served as the basis for determining how respondents participate in boating activities. The surveys made it possible to estimate the boat-related visitation in the Delta for the year 2000. Population growth, increasing boat registration over and above the population growth, and the assumed improved attractiveness of the Delta resource establish trends in visitation and in demand for boating-related services and facilities. These factors make it possible to project boat-related visitation in the Delta for the horizons 2005, 2010, 2015, and 2020.

PEAK-DEMAND DAY ASSUMPTIONS

In order to convert these estimates of participation or demand rates into facility requirements, it is necessary to make some assumptions regarding the number of visitors present on a peak-day. For the purposes of this study, the peak-demand day has been designated as a high-use Saturday in the month of July. This parameter was derived from calculations from the DPR 1997 *Delta Recreation Study*. One might consider a peak holiday such as Memorial Day as a preferable designation for the peak-day of the year, however, holiday weekends represent the "maximum magnitude" overflow days that actually only occur four to six days a year. Consequently, it is not considered practical or beneficial to design facilities for capacities that occur so infrequently. Therefore the calculations of peak-day demand as shown in **Table 6-12** are based on a non-holiday-Saturday in July as described above.

Translating peak-day demand into facility requirements utilized estimates of daily turnover

and/or accepted user-to-facility, person, or boat ratio standards. Peak-day demand was modified by the anticipated turnover or capacity for each type of facility. The estimated quantity and type of facilities required to accommodate peak-day demand for the year 2000 are shown in **Table 6-12**.

The facility needs, in terms of the number or size of facilities required, were then compared with the total of existing Delta facilities to determine whether the existing inventory of facilities is adequate in terms of anticipated demand. The difference between the facilities needed and the number of facilities in the existing Delta inventory represents the surplus or deficit of facilities. The methodology outlined above was then applied to boating populations as based upon projected visitation growth for the years 2005, 2010, 2015, and 2020.

DELTA BOATING-RELATED FORECAST OF FACILITY REQUIREMENTS, YEARS 2000 THROUGH 2020

Table 6-13 demonstrates the change in demand between 2000 and 2020 from the anticipated growth during this period. This table displays the number and type of facilities that will be required to accommodate the existing and future demand for boating in the Delta. The existing 2000 deficit in boating-related facilities is combined with the growth projections to provide the cumulative estimate of the additional number or size of facilities by type that will be required in the Delta between the years 2000 and 2020.

DELTA BOATING FACILITY DEFICIENCIES AND RELATED DESIGN STANDARDS

Boat Slips

The demand for marina slips and related parking spaces is driven primarily by the increasing numbers of boats over 26 feet in length. In general, the Delta appears to have a lower percentage of small-boat slips compared with other parts of the state. It is assumed that the present trend of converting small-boat slips to larger slips will continue, dropping the percentage of aggregate small-boat slips over the next 20 years from the current ten percent to five percent by the year 2020. Utilizing the forecast increase in

visitation as a guide, the increase in slips should rise from the current estimated 11,674 slips to 14,604 by 2020.

Based on observations during the field investigations and surveys of the Delta marina facilities, it is estimated that marina slips for the large-boat category are occupied from 85 percent to 95 percent of the year, while slips for the small-boat category are generally occupied from Memorial Day to Labor Day. This estimate corresponds with the expressed desire of marina operators in either upgrading existing small-boat slips or expanding to build additional slips for boats over 26 feet in length. The demand for additional boat slips for the year 2020 is forecasted to be 2,931. This includes 2,051 covered slips and 880 uncovered slips.

The estimate for covered boat slips is predicated on the assumption that 70 percent of new boat slips will be covered. This assumption is based on marina survey findings and the observation that the majority of demand for new slips appears to be for large boats for which covered slips are most in demand owing to the fact that large-boat owners generally prefer covered slips since many owners leave their boats in slip-storage year-round.

Marina Related Parking Spaces

Demand for marina-serving parking spaces was projected using a design standard of 0.6 spaces per boat slip. This includes parking for boat owners and guests as well as day users who visit the marina site. This standard was derived from the *DBW Handbook*. Due to the current surplus of parking spaces throughout the Delta, there are only 37 additional marina-related parking spaces needed to meet the demand by the year 2020.

Boat Launch Lanes

Needs for boat launch lanes were projected on the basis of the number and percentage of survey respondents who said they launch their own boats when they boat in the Delta. Of this group, all were small-boats owners. The standard of one boat lane for 40 boats launched per day per lane was utilized for this study. This standard is based on an average range of 30 to 50 boats per lane per day as listed in the *DBW Handbook*. Using this standard, there will be a deficit of 92 boat launch lanes by the year 2020.

Vehicle/Boat Trailer Parking Spaces

To ascertain the required vehicle/boat trailer parking spaces, a standard of 0.6 parking spaces per boat launch/retrieval per day was used. This standard was obtained from the *DBW Handbook*. Research indicates there will be a deficit of 1,968 vehicle/boat trailer parking spaces to meet the demand for the year 2020.

Transient Dock Tie-Ups

Survey respondents indicated a high demand for additional transient dock tie-up spaces. A standard was developed through analyzing these data and determining the number of slips required to service the boats in operation on a peak-day. The standard for marina tie-ups on the peak-day was determined to be one tie-up per 18 boats in use.

There is also a high demand for additional transient dock tie-up spaces. It relates to the desire of boaters (particularly cruisers) to be able to boat to different destinations on day trips in order to engage in various land-based social activities, including entertainment and visiting restaurants and other points of interest. For the purpose of this study, a tie-up at a transient dock is considered at an average of 30 linear feet of dock space. Using this methodology, there will be a need for 273 transient dock tie-ups to meet the demand for the year 2020.

Restroom Stalls

Restroom stall needs are projected at a design standard of one fixture per 30 visitors. This standard is based on this study's interpretation of various county-based environmental health department standards. This quantification takes into account separate sex and unisex restrooms and an approximate number of fixtures that might be located at each site in the Delta. For the purpose of this study, the sizes of restrooms are approximated to meet minimum health department standards at each facility based on the number of campsites, day-use type picnic sites, and marina slips accommodating boats without sanitation hookups. An estimate of the share of total boats using the Delta that have sewage holding tanks aboard was also used in making this determination. These primarily involve the large-boat category. Based on this standard, there will be a need for 187 restroom fixtures to meet the demand for the year 2020.

Shower Stalls

Future needs for shower stalls were projected from the baseline inventory of 384 units at the rate of 1.3 percent increase for the 20-year period. This is the probable rate of increased visitation, as depicted in **Table 6-10**. Using this methodology, there are 89 shower stalls needed to meet the demand for the year 2020.

Day-Use/Picnic Sites

Day-use picnic site requirements were based on survey respondents who indicated that they picnicked as a part of their Delta experience. This estimate accounted for a percentage of boaters that might typically picnic on their boats and also incorporated a factor for a turnover ratio of picnic facilities. Using this methodology, 173 additional day-use/picnic sites will be needed to meet the demand for the year 2020.

The demand for non-boating-related picnic sites was not assessed as part of this research.

Camping/RV Sites

The projected need for boating-related camping/RV sites was also derived from the boater survey data. This estimate factored the percentage

of visitors who indicated that they camp when visiting the Delta, and then applied those percentage breakouts to the estimated increases in total visitation.

Based on this analysis and as indicated in **Table 6-12**, there will be a surplus of 940 Camping/RV sites from the year 2000 to 2020. **Table 6-13** also suggests that sufficient campsites are presently in the inventory to take care of the boating-related demand for campsites. However, this result does not consider the non-boating-related demand for camping/RV sites. This additional potential demand was not measured in this research and could accelerate the demand for camping and RV sites in the Delta.

Fuel/Pumping Stations

Fuel dispensing along with sanitation pumping, bilge pumping, and disposal of oil are all services that are provided at a "fuel dock" on a marina. For this reason, these services have been combined into one facility, based on fuel station demand (See **Table 6-13**). This supposition approximates the same growth rate as all the classes of registered boats that would likely utilize this service, based on the 1995 to 2000 actual DMV and Documented Vessel annual boat registration growth rate of 1.2 percent per year. (1.2 percent x 20 years = 24 percent increase total). Based on this analysis, 14 additional fuel/pumping stations will be needed to meet the demand of the year 2020.

Dry Boat Storage Facilities

Currently there are sufficient facilities for 5,542 dry storage spaces in the Delta. Typically, the small-boat category occupies this type of storage units. In order to project demand for future dry storage, the classes of boats that are candidates for dry storage and registered in 1995 and 2000 were identified as shown in **Table 6-10**. The growth rate for these DMV and Documented Vessel registered boats from 1995 to 2000 was .42 percent per year. This growth rate was then applied to the years 2001 through 2020 (.42 percent x 20 years = 8.4 percent). Using this methodology, 466 additional dry boat storage spaces will be needed to meet the demand for the year 2020.

Since dry boat storage is currently the preferred type of dry boat storage among marina owners and small-boat owners interviewed, we have estimated costs based on dry stack storage type development.

2000-2020 BOATING FACILITY NEEDS AND MAGNITUDE OF COST ESTIMATES

Based on demand, facility needs fall into four categories: replacement, upgrade, repair, or new facilities. There are deferred maintenance and repair needs at 29 of the 58 marinas contacted. These needed improvements, and the estimated costs associated with them, are described in **Chapter 5** of this report. This chapter addresses those facility needs that are associated with increased demand up to the year 2020.

In determining the magnitude of cost for these facilities, year 2002 unit cost factors were used that were developed by an engineering firm familiar with construction work in the Delta. **Table 6-13** provides a breakdown of the facilities and associated costs to meet the demand for boating-related facilities for the years 2001, 2005, 2015, and 2020.

6.8 SUMMARY OF ADDITIONAL FACILITIES AND COST ESTIMATES 2000-2020

Based on year 2002 dollars, the total estimated cost projected through the 20-year study period to remedy deficient Delta facilities is \$84 million. A summary of these costs broken down by facility category is shown as follows in **Table 6-14**.

**Table 6-14
Summary of Additional Facilities**

Item	Costs (000s)
Covered Boat Slips	\$47,628
Uncovered Boat Slips	\$14,080
Transient Docks	\$2,184
Dry Boat Storage Spaces	\$2,572
Marina Parking	\$34
Boat Launch Lanes	\$10,350
Boat Trailer Parking	\$2,755
Restroom Stalls	\$2,384
Shower Stalls	\$712
Day-Use/Picnic Sites	\$433
Camp/RV Sites	\$ -
Fueling/Pumping Stations	\$770
Total	\$83,903

These costs are for existing deficits in the benchmark year 2000 as well as for future estimated demand in the years 2005, 2010, 2015, and 2020. Cost estimates for the rehabilitation or replacement of existing facilities are found in **Chapter 5**.

Table 6-15 interprets the visitation breakout based on relative demand levels determined with the Econometric Model and shows the estimated percentage of visitation per each Delta zone for the years 2000, 2005, 2015, and 2020. A summary of this visitation distribution by zone is shown in **Table 6-16**.

**Table 6-16
Visitation Distribution by Zone**

Zone	Percent
North Zone	13%
Northwest Zone	6%
Central Zone	15%
West Zone	42%
East Zone	13%
South Zone	11%
TOTAL	100%

Delta zone improvement needs and their related costs were established for each time horizon year and Delta zone based on the Econometric Model (**Appendix 6-1**) projected percentage of use.

Table 6-17 shows the distribution improvement costs among the six Delta zones for the duration of the planning period. A summary of these costs by zone is shown in as follows in **Table 6-18**.

Table 6-18

Summary of Cost by Delta Zone

Delta Zone	Costs (000s)	Percent
North Zone	\$11,049	13%
Northwest Zone	\$4,785	6%
Central Zone	\$12,844	15%
West Zone	\$35,058	42%
East Zone	\$11,303	13%
South Zone	\$8,864	11%
All Delta Zones	\$83,903	100%

Table 6-19 through **Table 6-23** provide breakdowns of facility needs based on costs distributed among the Delta zones for the specific horizon years.